CLAIMS

1. A filamentary means for the introduction of an agent into a living host, comprising a filament comprising a solid core and a porous sheath, wherein the porous sheath comprises a bioabsorbable sheath polymer which coats at least a portion of the solid core.

2. The filamentary means of claim 1, wherein the solid core comprises a bioabsorbable material selected from the group consisting of a glass, a ceramic, and a polymer.

3. The filamentary means of claim 1, wherein when the solid core is made of a biocompatable material selected from the group consisting of metals or alloys containing the elements of iron, nickel, aluminum, chromium, cobalt, titanium, vanadium, molybdenum, gold, and platinum.

4. The filamentary means of claim 1, wherein the bioabsorbable sheath polymer is selected from the group consisting of poly(lactic acid), poly(glycolic acid), poly(trimethylene carbonate), poly(amino acid)s, tyrosine-derived poly(carbonate)s, poly(carbonate)s, poly(caprolactone), poly(para-dioxanone), poly(ester)s, poly(ester-amide)s, poly(anhydride)s, poly(ortho ester)s, collagen, gelatin, serum albumin, proteins, carbohydrates, poly(ethylene glycol)s, poly(propylene glycol)s, poly(acrylate ester)s, poly(methacrylate ester)s, poly(vinyl alcohol), and copolymers, blends and mixtures of said polymers.

5. The filamentary means of claim 1, further comprising an agent.

6. The filamentary means of claim 5, wherein the agent is living cells.

7. The filamentary means of claim 6, wherein the living cells are obtained from hair follicles.

8. The filamentary means of claim 6, wherein the living cells are genetically engineered cells.

9. The filamentary means of claim 6, wherein the living cells are encapsulated.

10. The filamentary means of claim 5, wherein the agent is cell signaling molecules.

11. The filamentary means of claim 5, wherein the agent is selected from the group consisting of: growth factors, drugs, recombinant molecules, cell recognition factors, cell binding site molecules, cell attachment molecules, cell adhesion molecules, proteins, glycoproteins, carbohydrates, naturally occurring polymers, synthetic polymers, semi-synthetic polymers, and recombinant polymers.

12. The filamentary means of claim 5, wherein the agent is coated on the outer surface of the porous sheath.

13. The filamentary means of claim 5, wherein the agent is mixed, dissolved, or imbedded within the porous sheath.

14. The filamentary means of claim 1, wherein porous sheath defines open pores which are substantially interconnected and large enough to admit the agent.

15. The filamentary means of claim 13, wherein the open pores are large enough to admit molecules ranging in molecular weight from about 500 to about 100,000 Daltons.

16. A method of making a filamentary means for introducing an agent into a living host, comprising the steps of:

a) providing a filamentary solid core,

b) providing a bioabsorbable polymer,

c) providing a pore-forming agent,

d) mixing said bioabsorbable polymer with the pore-forming agent,

e) coating said mixture onto the solid core, and

f) substantially removing or decomposing the pore-forming agent.

17. The method of claim 15, wherein the bioabsorbable polymer is poly(L/DL-lactide).

18. The method of claim 15, wherein the pore-forming agent provided in step (c) is azodicarbonamide.

19. The method of claim 15, wherein the pore-forming agent provided in step (c) is urea dicarboxylic acid anhydride.

20. The method of claim 15, wherein coating step (e) is performed by melt extrusion.

21. The method of claim 15, wherein coating step (e) is performed by additional steps comprising:

dissolving said bioabsorbable polymer in a polymer solvent to form a solution,

coating at least one end of the solid core by placing it in the solution, and

removing the solid core from the solution.

22. The method of claim 15, wherein the polymer solvent is also the pore-forming agent.

23. A method of producing a device to deliver hair follicle cells through the skin of a living host to promote hair growth therein, comprising the steps of:

a) providing a plurality of filaments, each filament comprising a solid core having a first end and a second end, and a bioabsorbable porous sheath which coats at least the first end of the solid core,

b) forming a device comprising a semi-rigid backing with the second end of each filament embedded therein, such that the second end of each filament protrudes from the semi-rigid backing a sufficient amount to penetrate the skin of the living host.

24. The method of claim 22, wherein the filaments embedded in semi-rigid backing are spaced the same distance apart as hairs on the normal scalp.

25. The method of claim 22, wherein the semi-rigid backing of embedded filaments is formed in step (b) according to the additional steps comprising:

inserting the first end of each filament into a mold containing holes that are spaced the same distance apart as hairs on the normal scalp and of a depth sufficient for the first end of each filament to penetrate the skin of a living host when embedded in the semi-rigid backing formed in the remaining steps below,

coating the second end of each filament protruding from the mold with a resin,

curing the resin into a solid polymer,

covering the surface of the polymer with a puncture resistant adhesive tape, and

removing the resulting device, a semi-rigid backing with an array of the first end of filaments protruding therefrom, from the mold.

26. A device for implanting cells into the skin of a living host, comprising:

a) a plurality of filaments, wherein each filament has a first end and a second end, each filament comprising a biocompatable core and a bioabsorbable porous sheath which coats the core at least at the first end of each filament, and

b) a semi-rigid backing with the second end of each of the plurality of filaments embedded therein, such that the first end of each filament protrudes from the semi-rigid backing.

27. The device of claim 25, wherein the device is designed for use in treating male pattern baldness, and the plurality of filaments protrude from the semi-rigid backing in a pattern which is the same as the pattern of hair growth in a normal human scalp.

28. The device of claim 25, wherein the device is designed for use in implanting genetically modified cells into the skin of a living being, and the filaments protrude from the semi-rigid backing at a sufficient depth to implant the genetically modified cells into target tissue.

29. A method of implanting cells into the skin of a living host, comprising the step of :

a) providing a device comprising a semi-rigid backing with a plurality of filaments embedded therein, wherein each filament has a first end and a second end and comprises a solid core which extends from the first end to the second end of the filament, and a bioabsorbable porous sheath which coats the core at the first end of each filament, wherein the second end of each filament is embedded in the semi-rigid backing and the first end protrudes therefrom,

b) seeding the porous coating at the first end of each filament with the cells,

c) implanting the cells into the skin of the living host by puncturing the skin with the first end of each filament,

d) removing the device from the skin after sufficient time has passed to allow the porous coating to separate from the first end of the solid core of each filament, leaving the porous coating and cells in the skin.

30. The method of claim 28, wherein the cells are hair follicle cells.

31. The method of claim 28, wherein the hair follicle cells are from a culture of hair follicle cells grown from cells removed from the living host.

32. The method of claim 29, wherein the filaments embedded in the device provided in step (a) protrude sufficiently far therefrom to penetrate into the skin of a living host when placed into contact therewith, and wherein the filaments protruding from the semi-rigid backing are spaced the same distance apart as hairs on the skin surface of a normal living host.

33. The method of claim 28, wherein the cells are selected from the group consisting of genetically modified cells and encapsulated cells from a source other than the living host.

34. A method of making a filamentary device for permanent implantation in a living host in order to facilitate the introduction of agents into the living host, comprising the steps of:

a) providing a plurality of filaments, each filament comprising a solid bioabsorbable core and a porous sheath of a bioabsorbable polymer material coating the core,

c) forming the plurality of filaments into a three dimensional matrix,

d) bonding the filaments together.

35. A method of facilitating the growth of new bone comprising the steps of:

a) providing an implantable device comprising a plurality of filaments, each filament comprising a solid bioabsorbable core and a porous sheath of a bioabsorbable material coating the core, wherein the plurality of filaments have been formed into a three dimensional matrix and bonded together,

b) seeding the implantable device with osteoblasts or other osteogenic substances,

f) implanting the device in a site where bone regeneration is desired.

36. A method of continuous delivery of drugs to a living body comprising the steps of:

a) providing a device comprising:

a plurality of filaments, wherein each filament has a first end and a second end, wherein each filament comprises a biocompatable wire core coated by a bioabsorbable porous polymer sheath in which the drug is soluble and permeable, and

a semi-rigid backing comprising a first surface and a reservoir, wherein the second end of each filament is fixed in the semi-rigid backing, such that the first end of each filament protrudes from the first surface and the second end of each filament is in contact with the reservoir;

b) puncturing the skin of the living host with the first end of each filament; and

c) introducing the drug to the living host through the reservoir of the semi-rigid backing and plurality of filaments in contact therewith.

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